DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

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December 16, 1999

Columbia Gas Transmission
Environmental Health & Safety
1700 MacCorkle Ave, SE
Charleston, WV 25314

Attn: Mr. Kent Milholland

Re: Report
Soil Sampling at Former Bangs
Compressor Station Pipe Yard
Bangs, Ohio

Dear Mr. Milholland:

Dames & Moore is pleased to present this report detailing activities conducted at the Former Bangs Compressor Station Pipe Yard on October 22, 1999. Pursuant to your request for soil sampling and analysis, and in accordance with our proposal of October 21, 1999, Dames and Moore mobilized to the former Columbia Gas Transmission (Columbia) Bangs facility on US Route 36 in Bangs, Ohio. The objective of this investigation was to evaluate the presence of arsenic in a site soil sample reported in the Weston Bangs Characterization Report.[1]

Background

Weston (1996) reported arsenic at a concentration of 107 mg/kg in Boring SS-010 at a depth of 6 to 7 feet. Compared to other Bangs soil samples analyzed for arsenic at that time, this concentration was relatively high and exceeds the residential characterization action levels (CALs) for arsenic at Columbia facilities. Based on this concentration, the United States Environmental Protection Agency, Region III (USEPA), requested that Columbia investigate arsenic at this Bangs location. The following narrative describes this investigation and presents the analytical results.

[1] Weston, Roy. F. 1996. Characterization Report, Bangs Operating Center, Bangs, Ohio, prepared for Columbia Gas Transmission Corporation, Charleston, West Virginia. June.

Methods

The approximate location of soil boring SS-010 was only identified in the Weston (1996) report by the intersection of two unpaved roads and the location of a former pipe stacking area (Figure 1). The pipes have since been removed. To evaluate the presence of arsenic in shallow soils in this area, four borings (SS-010E, SS-010N, SS-010W, and SS-010S) were drilled near the approximate location of Weston's SS-010 boring. The soil borings were located approximately 12 feet away from the assumed location of SS-010, in each of the four cardinal directions. Soil samples were collected utilizing a Geoprobe® direct-push drilling apparatus, and each boring was sampled continuously to a depth (11 to 12 feet). Each boring was logged by a field geologist, who evaluated soil stratum based upon the Unified Soil Classification System (U.S.C.S.). Selected soil samples were collected from three intervals (3 to 4, 6 to 7, and 10 to 11 feet) within each of the four borings for laboratory analyses.

Soil samples were split to facilitate field screening. Approximately one half of each soil sample was placed in clean, laboratory-supplied glass containers. The containers were labeled with the date, time, sample location, and sampler name. After the samples were labeled, they were placed into an ice-filled cooler. The other half of the sample was placed in a resealable plastic bag for field screening utilizing an HNu® photoionization detector (PID) equipped with a 10.2eV lamp to assess relative concentrations of certain volatile organic compounds (VOCs). Prior to screening the samples, the PID was calibrated with background air and isobutylene calibration gas (100 ppm). Samples were allowed approximately 0.5 hour to equilibrate with the headspace prior to headspace analysis. PID screening results are included in the boring logs (Attachment A and Table 1).

Some petroleum odors were noted in shallow soil samples examined from borings SS-010W, and SS-010S. The presence of the odors was confirmed by results of the headspace analysis.

Four soil samples from the 6 to 7 foot interval of each boring and 1 sample from the 3 to 4 foot interval from SS-010E were marked for arsenic analysis. Additionally, based upon high headspace readings and pursuant to discussions with Columbia, 8 soil samples from the 3 to 4 foot and 6 to 7 foot intervals of each soil boring were analyzed for benzene, toluene, ethylbenzene, total xylenes, (BTEX) and polynuclear aromatic hydrocarbon (PAH) constituents. A laboratory courier picked up and delivered samples for analysis to Kemron Environmental

Services of Marietta, Ohio under proper chain of custody and in accordance with U.S. EPA and Ohio EPA guidance.

Results and Conclusions

Analytical results are included in Appendix B and summarized on Table 1. Results from the arsenic analyses (range: 3.9 to 11 mg/kg) indicate that the highest levels of arsenic were found in soil samples from boring SS-010E at both the 3 to 4 foot and 6 to 7 foot intervals (Table 1). These results are below the arsenic background concentrations (12.2 to 24.2 mg/kg) reported by Weston (1996). Based on these results, no further action regarding this issue is warranted.

Analyses for organic constituents within the four borings indicate that highest levels of ethylbenzene (300 ppb) and xylenes (130) were detected at the 3 to 4 foot interval of boring SS-010S and at the 6 to 7 foot interval of boring SS-010W, respectively. Only one boring (SS-010S, 3 to 4 feet) exhibited detections for PAH constituents, and no significant amounts of benzene or toluene were detected in any of the analyses. All BTEX results were below the CALs and therefore, no further action regarding these constituents is warranted. However, there was laboratory matrix interference in the analysis of the 3 to 4 foot sample for SS-010W, which generated high detection limits (790 ug/kg) in the BTEX analysis.

All PAH results were below the CALs except for sample SS-010S at 3 to 4 feet below ground surface, which had exceedances for benzo (a) anthracene, benzo (b) fluoranthene, and benzo (a) pyrene. Pursuant to Columbia's Administrative Order of Consent, site specific concentrations were calculated for the PAHs (Table 2). Only benzo (a) pyrene (1300 ug/kg) exceeds the calculated site concentration of 640 ug/kg.

The CALs are risk-based numbers that assume daily exposure to soils via incidental ingestion by a residential receptor. Human health risk is a consequence of the magnitude and frequency of exposure to a chemical constituent in an environmental medium. According to the U.S. Environmental Protection Agency[2] (USEPA), for an exposure pathway to be complete, the following conditions must exist:

1. A source and mechanism of chemical release to the environment;

[2] USEPA. 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual. Office of Emergency and Remedial Response. EPA/540/1-89/002. December.

2. An environmental transport medium (e.g., air, water, soil);

3. **A point of potential receptor contact with the medium;** and

4. A human exposure route at the point of contact (e.g., inhalation, ingestion, dermal contact).

For the benzo (a) pyrene concentration in question, condition number 3 above is not satisfied because soils are not available for direct daily contact by a human receptor. Due the lack of a complete exposure pathway, no further action is warranted for benzo (a) pyrene.

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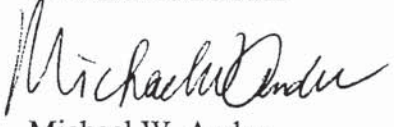
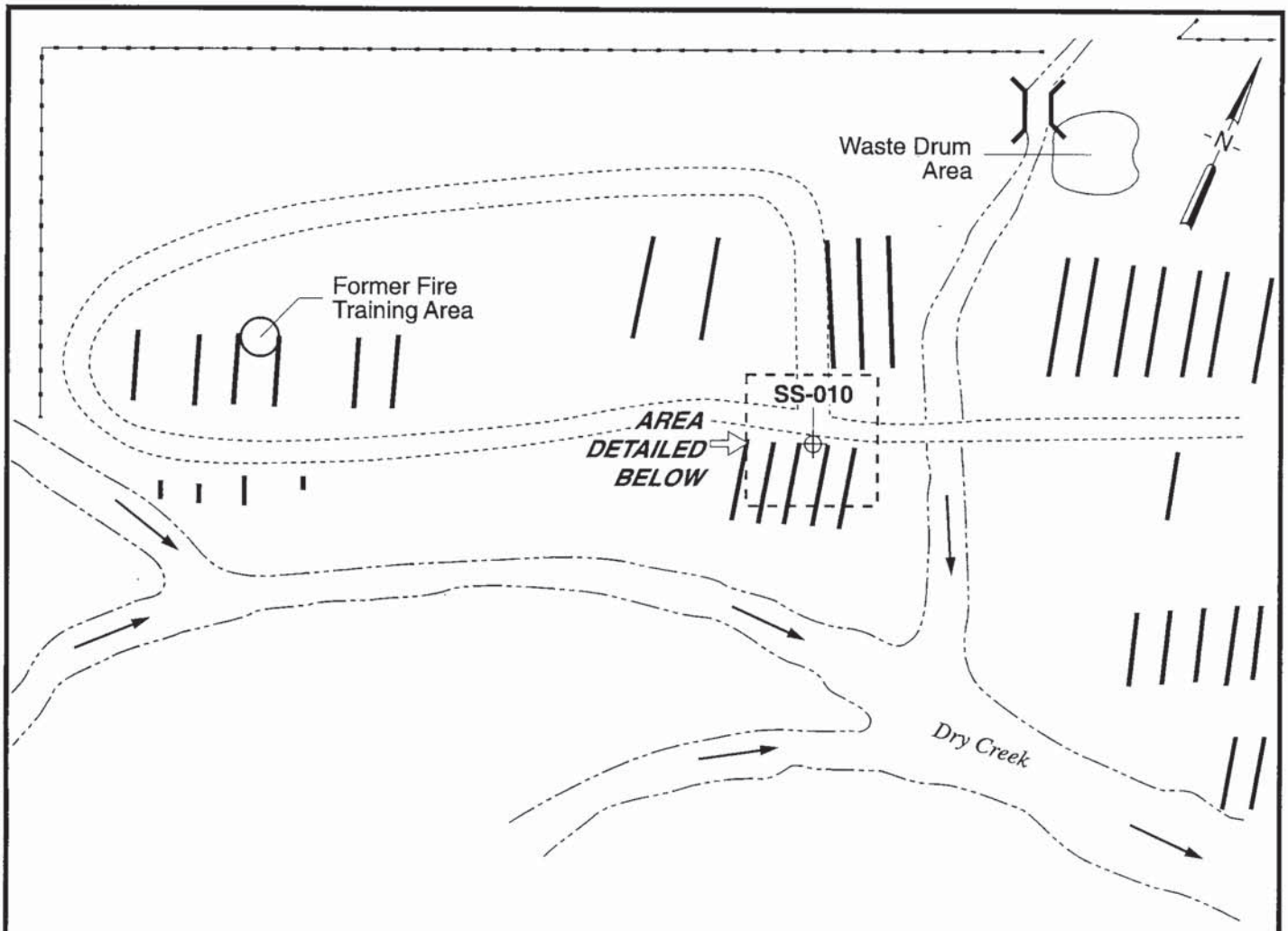
Dames & Moore appreciates the opportunity to be of service to Columbia Gas Transmission. Please do not hesitate to call the undersigned with any questions or comments.

Sincerely,

DAMES & MOORE



Michael W. Ander
Principal



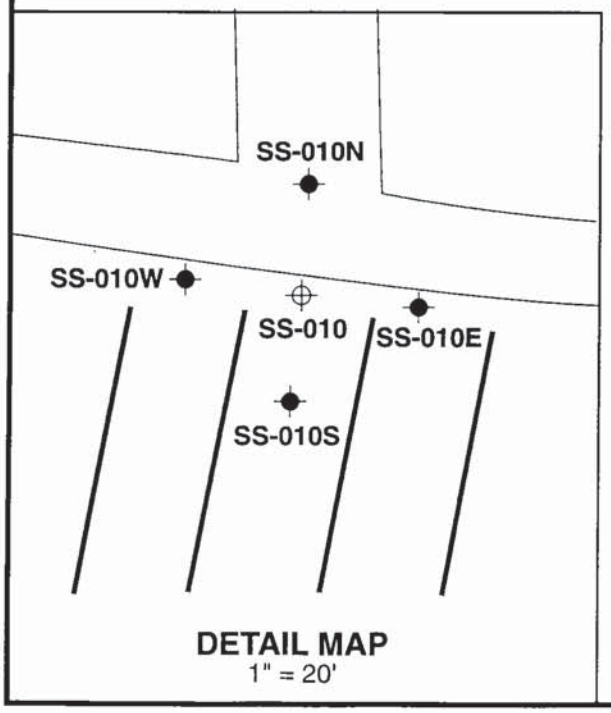
LEGEND:

- Soil Boring Sampling Location (Roy F. Weston - November 1995)
- Soil Boring Sampling Location (Dames & Moore - October 1999)
- Fenceline
- Unpaved Road
- Surface Water Flow Direction

0 75 150

APPROXIMATE SCALE IN FEET

BASE MAP SOURCE: Modified from Roy F. Weston, Characterization Report, Figure 3, Bangs Operating Center, Bangs, Ohio, June 1996.



DETAIL MAP
1" = 20'

COLUMBIA GAS TRANSMISSION

FIGURE 1
SOIL SAMPLING LOCATIONS
COMPRESSOR STATION PIPE YARD
FORMER BANGS OPERATING CENTER

JOB NO. 11879-113-007

Dames & Moore

COLUMBIA GAS TRANSMISSION - 11879-113-0105-007 - FORMER BANGS OPERATING CENTER

ATTACHMENT B
LABORATORY DATA

ENVIRONMENTAL STANDARDS
Setting the Standards for Innovative Environmental Solutions

1140 Valley Forge Road
P.O. Box 911
Valley Forge, PA 19482-0911
Phone - (610) 935-5577
Fax - (610) 935-5583

TRANSMITTAL FORM

To: Dames & Moore
1701 Golf Road Suite 1000
Rolling Meadows, IL 60008

Attn: Mike Ander

Date: November 15, 1999
Reference: Bangs Operations Center

Project No.: 98020728.IT26, Task 0006A

ENCLOSED HEREWITH ARE THE FOLLOWING:

ITEM	*DESCRIPTION*	*NO. OF COPIES*
1	Comprehensive Analytical Results tables for Bangs Operations Center samples from 10/22/1999	1

REMARKS: Enclosed are the data tables for the soil samples taken on October 22, 1999 at Bangs Operations Center. Please review these tables and call me at 610-935-4441 with any questions or corrections concerning these tables. Thank you.

cc: File

Sincerely yours,

(b) (4) [redacted]

(b) (4) [redacted]

Comprehensive Analytical Results
Characterization Samples

		PRA	14					
		PRA Description	PIPEYARD					
		Sample Type	Normal Sample					
		Sample Id	BAN-ASS001-40001		BAN-ASS001-40002		BAN-ASS002-40001	
		Depth - ft bgs	3 - 4		6 - 7		3 - 4	
		Collected Date	10/22/99		10/22/99		10/22/99	
		Laboratory	Kemron Environmental Services		Kemron Environmental Services		Kemron Environmental Services	
		Sample Collector	Dames & Moore		Dames & Moore		Dames & Moore	
		Result Units	MG/KG		MG/KG		MG/KG	
Category	Analyte	Action Level	Result Flag	Det Lim	Result Flag	Det Lim	Result Flag	Det Lim
VOA	BENZENE	22	0.006 U	0.006	0.007 U	0.007	0.032 U	0.032
	TOLUENE	16000	0.006 U	0.006	0.007 U	0.007	0.031 J	0.032
	ETHYL BENZENE	7800	0.006 U	0.006	0.007 U	0.007	0.032 U	0.032
	XYLENES (TOTAL)	1000000	0.006 U	0.006	0.007 U	0.007	0.096	0.032
BNA	NAPHTHALENE	1600	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
	ACENAPTHYLENE	4700	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
	ACENAPHTHENE	4700	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
	FLUORENE	3100	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
	PHENANTHRENE	23000	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
	ANTHRACENE	23000	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
	FLUORANTHENE	3100	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
	PYRENE	2300	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
	BENZO(A)ANTHRACENE	.87	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
	CHRYSENE	87	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
	BENZO(B)FLUORANTHENE	.87	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
	BENZO(K)FLUORANTHENE	8.7	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
	BENZO(A)PYRENE	.087	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
	DIBENZO(A,H)ANTHRACENE	.087	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
	BENZO(GHI)PERYLENE	2300	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42

Note:

Blank cells in result column indicate an analysis was not performed for that analyte.

Comprehensive Analytical Results
Characterization Samples

		PRA	14					
		PRA Description	PIPEYARD					
		Sample Type	Normal Sample					
		Sample Id	BAN-ASS001-40001		BAN-ASS001-40002		BAN-ASS002-40001	
		Depth - ft bgs	3 - 4		6 - 7		3 - 4	
		Collected Date	10/22/99		10/22/99		10/22/99	
		Laboratory	Kemron Environmental Services		Kemron Environmental Services		Kemron Environmental Services	
		Sample Collector	Dames & Moore		Dames & Moore		Dames & Moore	
		Result Units	MG/KG		MG/KG		MG/KG	
Category	Analyte	Action Level	Result Flag	Det Lim	Result Flag	Det Lim	Result Flag	Det Lim
	INDENO(1,2,3-C,D)PYRENE	.87	0.39 U	0.39	0.48 U	0.48	0.42 U	0.42
METAL	ARSENIC, TOTAL	.43	11.0	1.2	11.0	1.4		

Note:

Blank cells in result column indicate an analysis was not performed for that analyte.

Comprehensive Analytical Results
Characterization Samples

		PRA						
		PRA Description						
		Sample Type						
		Sample Id	BAN-ASS002-40002		BAN-ASS003-40001		BAN-ASS003-40002	
		Depth - ft bgs	6 - 7		3 - 4		6 - 7	
		Collected Date	10/22/99		10/22/99		10/22/99	
		Laboratory	Kemron Environmental Services		Kemron Environmental Services		Kemron Environmental Services	
		Sample Collector	Dames & Moore		Dames & Moore		Dames & Moore	
		Result Units	MG/KG		MG/KG		MG/KG	
Category	Analyte	Action Level	Result Flag	Det Lim	Result Flag	Det Lim	Result Flag	Det Lim
VOA	BENZENE	22	0.032 U	0.032	0.79 U	0.79	0.033 U	0.033
	TOLUENE	16000	0.032 U	0.032	0.79 U	0.79	0.033 U	0.033
	ETHYL BENZENE	7800	0.016 J	0.032	0.79 U	0.79	0.015 J	0.033
	XYLENES (TOTAL)	1000000	0.094	0.032	0.79 U	0.79	0.13	0.033
BNA	NAPHTHALENE	1600	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43
	ACENAPTHYLENE	4700	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43
	ACENAPHTHENE	4700	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43
	FLUORENE	3100	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43
	PHENANTHRENE	23000	0.42	0.42	0.42 U	0.42	0.43 U	0.43
	ANTHRACENE	23000	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43
	FLUORANTHENE	3100	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43
	PYRENE	2300	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43
	BENZO(A)ANTHRACENE	.87	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43
	CHRYSENE	87	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43
	BENZO(B)FLUORANTHENE	.87	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43
	BENZO(K)FLUORANTHENE	8.7	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43
	BENZO(A)PYRENE	.087	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43
	DIBENZO(A,H)ANTHRACENE	.087	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43
	BENZO(GHI)PERYLENE	2300	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43

Note:

Blank cells in result column indicate an analysis was not performed for that analyte.

Comprehensive Analytical Results
Characterization Samples

		PRA						
		PRA Description						
		Sample Type						
		Sample Id	BAN-ASS002-40002		BAN-ASS003-40001		BAN-ASS003-40002	
		Depth - ft bgs	6 - 7		3 - 4		6 - 7	
		Collected Date	10/22/99		10/22/99		10/22/99	
		Laboratory	Kemron Environmental Services		Kemron Environmental Services		Kemron Environmental Services	
		Sample Collector	Dames & Moore		Dames & Moore		Dames & Moore	
		Result Units	MG/KG		MG/KG		MG/KG	
Category	Analyte	Action Level	Result Flag	Det Lim	Result Flag	Det Lim	Result Flag	Det Lim
	INDENO(1,2,3-C,D)PYRENE	.87	0.42 U	0.42	0.42 U	0.42	0.43 U	0.43
METAL	ARSENIC, TOTAL	.43	6.5	1.3			3.9	1.3

Note:

Blank cells in result column indicate an analysis was not performed for that analyte.

Comprehensive Analytical Results
Characterization Samples

		PRA				
		PRA Description				
		Sample Type				
		Sample Id	BAN-ASS004-40001		BAN-ASS004-40002	
		Depth - ft bgs	3 - 4		6 - 7	
		Collected Date	10/22/99		10/22/99	
		Laboratory	Kemron Environmental Services		Kemron Environmental Services	
		Sample Collector	Dames & Moore		Dames & Moore	
		Result Units	MG/KG		MG/KG	
Category	Analyte	Action Level	Result Flag	Det Lim	Result Flag	Det Lim
VOA	BENZENE	22	0.030 U	0.030	0.007 U	0.007
	TOLUENE	16000	0.009 J	0.030	0.007 U	0.007
	ETHYL BENZENE	7800	0.30	0.030	0.009	0.007
	XYLENES (TOTAL)	1000000	0.068	0.030	0.034	0.007
BNA	NAPHTHALENE	1600	1.1	0.80	0.44 U	0.44
	ACENAPTHYLENE	4700	0.80 U	0.80	0.44 U	0.44
	ACENAPHTHENE	4700	0.80 U	0.80	0.44 U	0.44
	FLUORENE	3100	0.80 U	0.80	0.44 U	0.44
	PHENANTHRENE	23000	0.56 J	0.80	0.44 U	0.44
	ANTHRACENE	23000	0.80 U	0.80	0.44 U	0.44
	FLUORANTHENE	3100	1.3	0.80	0.44 U	0.44
	PYRENE	2300	1.3	0.80	0.44 U	0.44
	BENZO(A)ANTHRACENE	.87	0.92	0.80	0.44 U	0.44
	CHRYSENE	87	1.2	0.80	0.44 U	0.44
	BENZO(B)FLUORANTHENE	.87	1.2	0.80	0.44 U	0.44
	BENZO(K)FLUORANTHENE	8.7	1.1	0.80	0.44 U	0.44
	BENZO(A)PYRENE	.087	1.3	0.80	0.44 U	0.44
	DIBENZO(A,H)ANTHRACENE	.087	0.80 U	0.80	0.44 U	0.44
	BENZO(GHI)PERYLENE	2300	0.57 J	0.80	0.44 U	0.44

Note:

Blank cells in result column indicate an analysis was not performed for that analyte.

Comprehensive Analytical Results
Characterization Samples

		PRA				
		PRA Description				
		Sample Type				
		Sample Id	BAN-ASS004-40001		BAN-ASS004-40002	
		Depth - ft bgs	3 - 4		6 - 7	
		Collected Date	10/22/99		10/22/99	
		Laboratory	Kemron Environmental Services		Kemron Environmental Services	
		Sample Collector	Dames & Moore		Dames & Moore	
		Result Units	MG/KG		MG/KG	
Category	Analyte	Action Level	Result Flag	Det Lim	Result Flag	Det Lim
	INDENO(1,2,3-C,D)PYRENE	.87	0.56 J	0.80	0.44 U	0.44
METAL	ARSENIC, TOTAL	.43			6.4	1.3

Note:

Blank cells in result column indicate an analysis was not performed for that analyte.